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Animal husbandry across the Western Roman Empire. Changes and continuities.

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Abstract:	This special issue of the European Journal of Archaeology discusses aspects of animal husbandry in a number of provinces of the Western Roman Empire. In this introduction, we describe the general characteristics of animal husbandry in pre-Roman and Roman times to assess any changes that may have occurred after the Roman conquest. The results suggest that the territoriality typifying the first millennium BC had a significant impact on production, resulting in a decrease in cattle size and frequencies across Europe. Nevertheless, not all the regions reacted in the same way, and regional communities that focused their animal production on pigs implemented more sustainable husbandry practices over time. By bringing together studies carried out across Europe, this paper highlights the existence of cases of both change and continuity across the Empire, and the (uneven) impact of the market economy on animal husbandry and dietary practices in climatically different regions.

Abstract

This special issue of the *European Journal of Archaeology* discusses aspects of animal husbandry in a number of provinces of the Western Roman Empire. In this introduction, we describe the general characteristics of animal husbandry in pre-Roman and Roman times to assess any changes that may have occurred after the Roman conquest. The results suggest that the territoriality typifying the first millennium BC had a significant impact on production, resulting in a decrease in cattle size and frequencies across Europe. Nevertheless, not all the regions reacted in the same way, and regional communities that focused their animal production on pigs implemented more sustainable husbandry practices over time. By bringing together studies carried out across Europe, this paper highlights the existence of cases of both change and continuity across the Empire, and the (uneven) impact of the market economy on animal husbandry and dietary practices in climatically different regions.

Keywords: domesticate animals, husbandry, Iron Age, Roman, Western Europe.

1. Introduction

This special issue of the *European Journal of Archaeology* discusses aspects of animal husbandry in a number of provinces of the Western Roman Empire. It aims to provide a synthesis of animal production before, during and after the Roman conquest in order to evaluate to what extent the Roman socio-political system caused parallel changes across the Empire. This review is today possible due to a combination of factors: in the last 20 years, there has been a significant increase in the number of excavations across Europe and, for many of them, animal remains have been recovered, studied and published. This now includes Southwestern Europe, which previously suffered from a dearth of excavations and published zooarchaeological studies of Iron Age and Roman date (e.g. King 1999). In addition, current technological opportunities facilitated the creation of an International Council of Archaeozoology working group on the zooarchaeology of the Roman Empire (ICAZ-RPWG), now counting nearly one hundred members from around the world.

The first meeting of the working group was held at the University of Sheffield (November 2014) and the papers included in this issue are a selection of presentations delivered at that meeting.

Other than a useful resource for specialists, we want this volume to highlight the importance of zooarchaeology for the understanding of the human past and Roman life in particular. This will be valuable as a way to combine zooarchaeology with other lines of archaeological evidence, an integration that has often been neglected. In the past fifteen years some Roman archaeology syntheses have looked at the animal bone evidence with greater attention than in the past (e.g. Todd 2004, Ward-Perkins 2005, Cool 2006). There is, however,

still much ground to cover and this monographic issue aims to help such endeavour.

2. Beyond 'Romanization' – how economy and culture shape production

There has been an extensive debate about the implications of the Roman conquest across the Empire, in different provinces, and from different perspectives (e.g. Millett 1990, Keay and Terrenato 2001, Pearce 2000, Purcell 2003, Revell 2005, Ward-Perkins 2005, Cool 2006, Todd 2007). The term often used to indicate such cultural diffusion is 'Romanization'. The appropriateness of such expression has intensively been discussed (e.g. Webster & Cooper 1996, Woolf 2014 and references within), but here we are not going to pursue such debate further. We will rather focus on the actual evidence of change and continuity and the reasons behind them. We will therefore first describe the general characteristics of animal husbandry in pre-Roman times in different territories in order to assess whether any change occurred after the Roman conquest.

Changes in animal production may occur at different levels and can affect the type of animals that were exploited, the size of the livestock and the products that were used (e.g. traction, wool, meat). Traditionally, these factors have been linked with the ecological conditions of different provinces as well as their cultural preferences (e.g. Barker 1975, Crabtree, 1991, King 1999). There is a clear connection between the two, as cultural traditions are not generated by chance, but they are rather developed in conjunction with the need to interact with the environment efficiently and in a sustainable way.

2.1 Animal production in Roman times: changes and continuities.

Multiple works demonstrate that cattle frequencies decreased during the first millennium BC in various territories across Western Europe. From north to south, this is the case of Denmark and Northern Germany (e.g. Randsborg 1985), Britain (e.g. Hambleton 1999, Albarella 2007), Northern France (e.g. Méniel 1984), Southern France (e.g. Columeau 2002), and North-Eastern Spain (e.g. Albizuri et al. 2010). In central Italy, a decrease of cattle frequencies is attested between the Middle-Recent Bronze Age and the Final Bronze Age (de Grossi Mazzorin 2002, fig. 1). In most cases, this coincides in time with the spread of fortifications and territoriality.

In contrast, there was a general increase of cattle and pig frequencies in the conquered territories across the Western Roman Empire and some adjacent territories (e.g. King 1984, Randsborg 1985, Lauwerier 1988, Lepetz 1996, Peters 1998, Forest 2007, Pigière 2015, Valenzuela-Oliver et al. 2013, see also papers in this volume). For Roman times, it may be claimed that these differences were related to the cultural tradition and socio-political system that came with the Roman conquest, which could have led to different requirements of animal production and preferences in meat diet (e.g. Peters 1998, King 1999, Albarella 2007). A global analysis of livestock proportions across the Roman Empire (King 1999), however, revealed that the picture was not homogeneous. In particular, Italy had an unusual high percentage of pig remains, which was not

found in any other region of the Empire. Therefore, multiple cultural traditions co-existed in the Empire, and various influences – not all of them originating from Italy – spread at different times. An example for this could be the spread of the 'cattle pattern' (characteristic of northern Gaul and Germany; King 1984) to Britain.

The situation for the territories conquered in Republican times in Mediterranean Europe (e.g. southern Gaul and the Iberian Peninsula) is more uncertain, as the available data are still scarce. In these regions, Roman troops would mainly be represented by people coming from Italy. A higher frequency of pig remains in the diet of the Roman soldiers may therefore be expected, although a certain adaptation to availability resources should be factored in (King 1984). Roman Italy saw an increase in pig consumption in the Republican period, though the phenomenon is far more pronounced in the later Imperial period (Fig.1)

The frequency of cattle and pig remains generally increased in both Spain and southern France in Roman times (e.g. Renaud 2012, Colominas 2013), but this was not a direct consequence of the Roman conquest. The increase in pig remains is already attested in faunal assemblages dated from the 3rd c. BC – before the conquest started – in contexts corresponding to the Iberian and Ligurian cultures (Colomer and Gardeisen 1992, Gardeisen 2003, Iborra 2004, Valenzuela-Lamas 2008, Albizuri et al. 2010, Nieto-Espinet 2012; fig. 1). Was this an early Italic influence, parallel to the spread of Campanian A pottery in these regions during the 4th and, especially, the 3rd century BC? Or could it be related to the developing urbanisation occurring in the Late Iron Age in these areas? Pigs are better suited to urban contexts than herbivores, which require more open land. The current body of data makes it difficult to discern the exact causes, but it is likely that different factors contributed to the currently observed pattern.

In the case of Roman Spain, the faunal record of Republican *Valentia* and *Baetulo* – two colonies of veterans built *ex-novo* in *Hispania Citerior* – may reflect the fact that Roman soldiers from Italy introduced their high pork diet. The faunal studies of these cities (Iborra 2017, Colominas 2013) revealed that pigs outnumbered the other domestic species, which clearly contrasts with indigenous Iberian sites. This, however, did not become a general pattern across the Iberian Peninsula, where sheep and goats –and cattle in the North– continued to be the main livestock (fig. 1, see also Colominas et al in this volume). Consequently, and as attested in other provinces, pigs are found to predominate only in some *villae* and some urban centres or military sites (e.g. Deschler-Erb et al. 2002, Grant 2007, Bernigaud et al. 2016). The suitability of pigs for urban contexts could have been an influence in some cases, but the predominance of pig remains in *villae* is likely to be related to Roman influence and taste.

Together with changes we also see notable examples of continuity across the Empire, especially in rural sites and secondary cities. Cattle continued to be the main species in many sites of the Netherlands, Belgium, Germany and Switzerland (e.g. Lauwerier 1988, Peters 1998, Groot & Deschler-Erb 2015, see also Trixl et al, Pigière, Groot, and Deschler-Erb in this volume), and caprines maintained their predominance in rural sites in Britain, Southern France and North-Eastern Spain (e.g. Albarella et al. 2008, Rizzetto et al., Renaud, and

Colominas et al. in this volume). In the western-most limes of the Empire – present day Portugal – no major changes in animal husbandry and meat diet have been attested (e.g. Davis 2006, Valenzuela-Lamas and Fabião 2012).

Consequently, a mixture of italic influences and assimilation to pre-Roman traditions occurred across the Western Roman Empire. We may relate the increase of pig husbandry to the developing urbanisation occurring in the Late Iron Age and the consolidation of urban centres in Roman times, but the influence of Roman culture from Italy should not be neglected, and it is particularly marked in *villae* across the Empire (e.g. Fishbourne palace, in Britain (Grant 2007), and the examples in Spain mentioned above). There are other examples that illustrate how meat diet was diverse across the Empire and travelled with people as part of their cultural identity. These include the above-mentioned case of the 'cattle pattern' in Britain (King 1984) and a number of military sites across the Empire (e.g. Kaiseraugst camp in Germany, with probable soldiers coming from Spain, see Deschler-Erb in this volume).

Cultural transmission, however, did not occur only according to a core-periphery model (i.e. Rome versus the rest of the Empire) but different areas of the Empire certainly influenced each other. The increase of cattle frequencies in early-conquered territories like Iberia and Southern France after the Roman conquest probably reflects changes linked with production, as cattle represent a small proportion of Italian Republican faunal assemblages (fig. 1).

Ecology has also been claimed as one of the key factors influencing animal husbandry regimes (e.g. Barker 1985, Davis 1987, among many others). Indeed, as previous works demonstrate, cattle frequencies were generally higher in areas with higher annual rainfall and better pastures (e.g. King 1999, see also papers in this volume). The existence of common husbandry patterns in the Iron Age, in areas that were significantly different from a cultural and ecological point of view, however, raises the question of the extent to which culture, society and diet are interrelated, perhaps beyond ecology. As an example of this, Southern Britain and North-eastern Spain have different ecological conditions, but experienced similar changes in animal husbandry before and after the Roman conquest (fig. 1). Cattle frequency decreased in the course of the first millennium BC but went up again after the Roman conquest (e.g. King 1984, Hambleton 1999, Albarella 2007, Albizuri et al. 2010, Colominas 2013). In contrast, some regions with fairly similar climatic conditions, such as North-Eastern Spain and Central Italy, had very different animal production systems both in the Iron Age and Roman times (fig. 1; de Grossi Mazzorin 2002, Trentacoste 2016). The main point in common between Iron Age Britain and North-Eastern Spain is the development of chiefdoms and early states during the first millennium BC, in which fortified settlements and an elite of warriors clearly emerged in the archaeological record (e.g. Cunliffe 1976, Sanmartí 2004). The main difference between North-Eastern Spain and North-central Italy was the degree of urbanisation and social complexity, which was more highly developed in Italy (e.g. Barker & Gamble 1985, Christie 1995, Cifani 2002). The evidence therefore suggests that socio-political systems contributed to shape animal husbandry production.

2.2 Large Roman cattle. Where and why?

Traditionally, large size has been used as a key criterion for assessing productivity in animal husbandry (e.g. Varro, Columella, Markham 1631). Larger size means that more labour force and more meat (also more milk and other products) can be obtained per animal. Therefore, large size is seen as a desirable characteristic that farmers may want to achieve and maintain. Husbandry books from the 19th century (Loudon, 1839), however, also inform us that large animals were more demanding of fodder and water, and therefore more difficult to maintain. They advice that small animals can be better suited in harsher environments and when there is a scarcity of available labour. Consequently, a reduction in the size of the animals could attest to the existence of unsuitable conditions for large animals.

Many zooarchaeological studies demonstrate that animal size –particularly in cattle – decreased across Europe from the Neolithic to the Iron Age (e.g. Matolcsi 1970, Bökönyi 1974, Méniel 1984, Altuna 1980, Ijzereef 1981, Vigne 1988, Valenzuela-Oliver et al. 2013). In Roman times, animal size (most notably cattle) increased *only* in the conquered territories (e.g. Teichert 1984, Lauwerier 1988, Audoin-Rouzeau 1991, Lepetz 1996, Peters 1998, Breuer et al. 1999, Forest and Rodet-Belarbi 2002, also in this volume: Colominas et al., Frémondeau et al., Groot, Pigière, Renaud, Rizzetto et al.). Yet, this tendency was not ubiquitous, and cattle size did not change in some areas of Raetia and southern Portugal (Trixl et al in this volume, Davis 2006).

North and Central Italy do, however, present a different trend (fig. 2). In these areas, cattle size decreased from the Neolithic to the Bronze Age, but it increased in the Iron Age, coinciding in time with the beginning of Etruscan culture and the installation of some Greek colonies in Latium and Campania (e.g. Riedel 1994, de Grossi Mazzorin 1995, de Grossi Mazzorin & Riedel 1997, Riedel et al. 2006).

The questions that arise are: why did these changes in size occur in areas that were so different in climate, environment and culture? Why did cattle increase in size in Italy in the early first millennium BC, when it was decreasing in other regions?

For the first millennium BC, this decrease in size contrasts with the significant improvements in agriculture and food processing occurring in this period (e.g. spread of rotation of cultures and spring cereals, iron ploughs, rotary querns; e.g. Jäger and Lozek 1982, Sherratt 1993, Van der Veen and O'Connor 1998, Alonso 1999, López et al. 2011). Hypotheses to explain this phenomenon include that small animals would be better suited and manageable for ploughing (e.g. Clutton-Brock 1981) and that there was an increase in the proportion of reproductive sub-adults in the population (Manning et al. 2015). It is difficult to explain the constant decrease of cattle size up to the Bronze and the Iron Age in many regions across Western Europe based on these hypotheses. After an initial size decrease, a suitable size for ploughing would probably be achieved, and it is difficult to justify –on the basis of this premise– why Roman cattle were as large as Neolithic cattle and still perfectly suited for ploughing (fig. 2). Regarding mortality profiles, a number of studies indicate the occurrence of a higher

emphasis on 'secondary products' in the Late Neolithic and the Bronze Age and, even more, in the Iron Age. This resulted in cattle being slaughtered older (e.g. Bogucki 1989, Albizuri et al. 2011, Sykes 2014, Valenzuela-Lamas 2016). Therefore, the mortality profiles do not support an increase in the proportion of reproductive sub-adults in cattle populations, as more adults would be alive for a longer period to reproduce.

Several studies suggest that animal size is highly related to nourishment regimes (e.g. Hammond 1960, Widdowson and Lister 1991). Other factors that may lead to size change include genetic diversity and flow: interbreeding and increased homozygosity leads to significant decreases in size in captive cattle (e.g. Baker et al. 1945, Sutherland and Lush 1962) and it also happens in humans (McQuillan et al. 2012, Joshi et al. 2015). More critically, interbreeding also entails a decrease in milk, fat and protein yields in cattle, and decreased fertility (Pryce et al. 2014).

In the Iron Age, either the improvements occurring in agriculture did not result in better nourishment of livestock in many regions, and/or there was a significant reduction in the genetic diversity at a local level, perhaps as a consequence of the territorialisation that characterises this time period. The Roman Empire – with the huge volume of trade that developed between regions – changed this picture completely. The larger scale economic structure entailed a higher degree of specialisation, thus allowing the farmers to adapt their production to the crops and animals better suited for the local conditions, rely on trade for other supplies, and re-invest the revenues from the trade of their own products (Ward-Perkins 2005). In addition, the political super-structure of the Empire allowed the building and maintenance of substantial public facilities such as aqueducts, roads and ports, which enhanced productivity and connectivity even further.

Strontium isotopes from cattle teeth demonstrate that not only soldiers, amphorae and crops travelled within the Roman network of roads and maritime trade, but also animals (Minniti et al. 2014). Consequently, enhanced genetic flow and better nourishment became possible in Roman times, in contrast with previous and later periods. Yet, not all animals in every province experienced growth at the same time and to the same extent (see Frémondeau et al. in this volume), and some livestock within the Empire remained small in size (e.g. Roman-Mediterranean milieu in Raetia, see Trixl et al. in this volume). Further investigations are needed to establish to what extent small animals and local breeds could have been elements of cultural identity and resistance (as suggested by classical sources, such as Tacitus, *Germania*, V). Alternatively, or additionally, these small animals may have been better suited for the harsh environmental conditions and the kind of small-scale exploitation that persisted in some of the conquered territories.

3. Culture and politics. The Roman Empire and changes in economy, territories and mobility.

As mentioned earlier, the Bronze and the Iron Ages are periods characterised by increased social differentiation and progressive territoriality. This is perceivable in the archaeological record by the expansion of fortifications across Europe (e.g.

Johnson and Earle 1987, Py 1993, Brun 1995, Collis 2003, Sanmartí 2004). Likewise, the spread of warrior equipment and weapons suggests that this process entailed a significant increase of warfare and probably involved the protection of boundaries between territories.

In the Iron Age, iron ploughing allowed new fields to be cultivated. The expansion of agriculture resulted in a reduction of the surface devoted to pasture. The archaeological record also suggests a notable demographic increase, after the introduction of iron technologies (e.g. references cited above). In this context of increased territoriality and expansion of agriculture, it is reasonable to think that cattle were the most difficult animal to herd, as they are the most demanding in water and fresh pasture, and require the best soils, where tall grass can grow. Additionally, land exploitation probably occurred at a small scale, therefore reducing the need of large animals. Interbreeding would have significantly increased, leading to a decrease of animal size and productivity.

Consequently, we may explain cattle frequency and size decreases in the first millennium BC through a combination of factors:

- Expansion of agriculture and demographic growth, with subsequent reduction of the areas of pasture in the hinterland of villages and emerging urban centres.
- Restriction of movement, consequent to the creation of military-protected boundaries.
- Reduced mobility of livestock, which entailed higher ratios of interbreeding.

This reduced mobility dramatically changed in Roman times. Both the creation of roads and the expansion of maritime trade enhanced mobility within the Empire and made long distance travelling easier and safer. In addition, larger animals – especially cattle – were better suited for the Roman economy. Commerce helped farmers in focusing on crops for which local conditions were well-suited and investing the profit obtained through trade in technical improvements.

Yet, regional differences persisted, and animal husbandry and meat diet changed to various degrees in different regions. Most papers in this special issue highlight that changes were not homogeneous within named *provincias* or neighbouring regions, and changes did not affect all sites in the same way. Urban sites, *villae* and military sites across the Empire display the higher degree of change, whereas rural sites more often retained forms of production that were closer to those of the Iron Age.

Significant variation exists between sites located in the same region and, more clearly, between regions. Despite substantial changes, some of the Iron Age traditions survived in the Roman period. This indicates that it was not Roman policy to obliterate the underlying local economies, but rather they tried to integrate them, making allowances for the economic, environmental and social needs of each region. Individuals and communities travelling across the Empire maintained some of their dietary preferences and in some cases they are recognisable in the archaeological record (e.g. above-mentioned cases of the

colonies of veteran soldiers in *Valentia* and *Baetulo* in *Hispania*, the Kaiseraugst camp in Germany, or Fishbourne Palace in Britain).

The general issues discussed above and the more detailed analyses that form this special issue show that zooarchaeology represents a valuable tool to recognise cultural preferences and assess the impact of socio-political and economic systems on animal husbandry. The territoriality that characterises the first millennium BC had a significant impact on production, resulting in a decrease in cattle size and frequencies. Nevertheless, not all the regions reacted in the same way. Regional communities that focused their animal production on pigs rather than herbivores – i.e. northern Gaul and north-central Italy – implemented more sustainable husbandry practices over time, as they decreased the competition between animals and cultivated land. In all conquered territories, the Romans built on the existing production systems and brought new dietary traditions and some exogenous species. Overall, the Romans expanded the market economy to unprecedented levels. After the collapse of long distance trade at the end of the Western Roman Empire, most regions developed again an un-specialised animal husbandry style, bearing some similarities with that of the Iron Age (see e.g. Grau-Sologestoa 2015, Rizzetto et al. in this volume). By bringing together studies carried out in different regions, this special issue highlights the existence of cases of both change and continuity across the Empire, and the (uneven) impact of the market economy on animal husbandry and dietary practices in climatically different regions.

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Animal husbandry across the Western Roman Empire. Changes and continuities.

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Figure 1. Percentage of the main domesticates in Southern Britain, North-Eastern Spain and Central Italy between the Late Bronze Age and Roman times. The grey vertical lines show the degree of confidence per chronology (two times the standard deviation). Data from Hambleton 1999, De Grossi 2002, Albizuri et al. 2010, Colominas 2013, and own data.

Figure. 2. Changes in cattle heights in Britain, Catalonia and Italy between the Neolithic and Roman times. The box contains the 50% of measurements per period, and the notches show the accuracy of the median value (two times the standard deviation). The asterisks show the results of the Mann-U tests with Bonferroni correction. ** = highly significant difference; ***= very highly significant difference. Data from Saña 1993, Riedel 1999, Locker 2000, Maltby 2010, Viner 2010, Albizuri 2011, Colominas 2013, Nieto et al. 2014, and own data.

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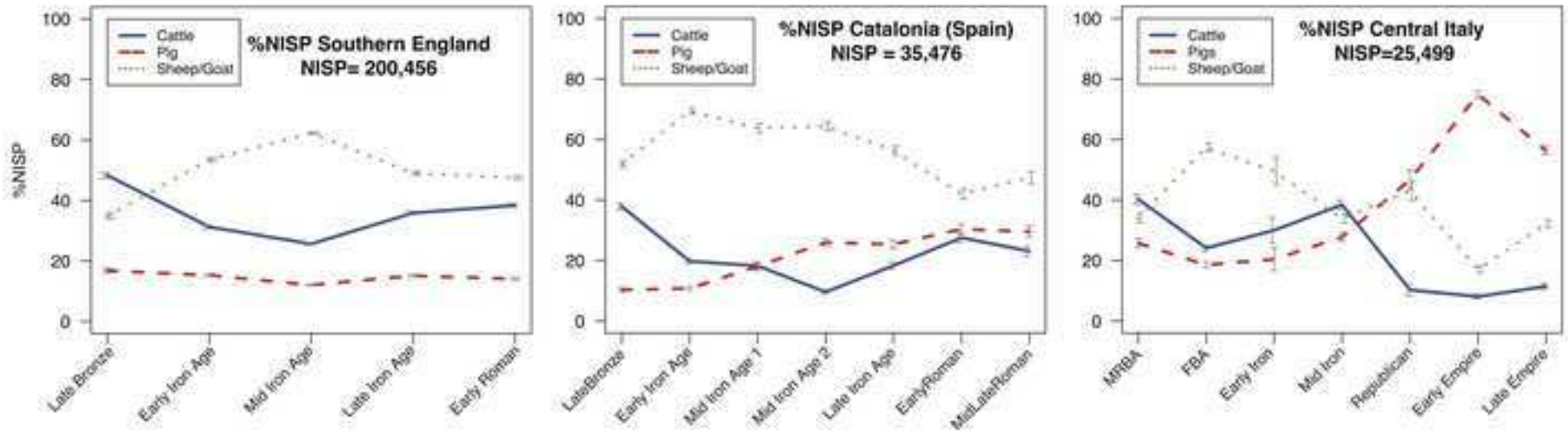

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